^{231}Pa and ^{233}Pa neutron-induced fission data analysis

Vladimir M. Maslov[1], Mamoru Baba[2], Akira Hasegawa[3], Nikolai V. Kornilov[4], Alexander B. Kagalenko[4], Natalia A. Tetereva[1]

[1] *Joint Institute for Nuclear and Energy Research - Sosny, 220109, Minsk-Sosny, Belarus*
[2] *Cyclotron and Radioisotope Center, Tohoku University, Sendai, Japan*
[3] *Japan Atomic Energy Research Institute,Tokai-mura, Naka-gun, Ibaraki-ken*
[4] *Institute of Physics and Power Engineering, Obninsk, Russia*

Neutron-induced fission data for ^{233}Pa nuclide are of much interest for the thorium fuel cycle development. Measured data base is comprized only from two data sets [1, 2, 3], which do not seem to be fully compatible. Application of Hauser-Feshbach statistical model for the analysis of neutron-induced fission data [1, 2] and ^{233} Pa(n,f) fission data [3], extracted from the transfer reaction ^{232}Th(^{3}He,p)^{234}Pa would be of much interest. Above emissive fission threshold fission probabilities of ^{233}Pa and ^{232}Pa nuclides, fissioning in ^{233}Pa(n,nf) and ^{233}Pa(n,2nf) reactions, respectively, could be estimated using data of transfer reactions ^{232}Th(^{3}He,d)^{233}Pa and ^{231}Pa(d,p)^{232}Pa [4]. First chance fission cross section is estimated based on consistent description of ^{238}U(n,f), ^{238}U(n,xn) and ^{232}Th(n,f), ^{232}Th(n,2n) data. This aproach could be validated in case of ^{231}Pa(n,f) neutron-induced fission data analysis. Data on fission of residual nuclides, emerging in transfer reactions ^{231}Pa(d,p)^{232}Pa, ^{230}Th(^{3}He,d)^{231}Pa and ^{230}Th(^{3}He,t)^{230}Pa are used for the ^{231}Pa(n,f)data analysis up to 20 MeV. Data by Kobayashi et al. [5] below fission threshold of ^{231}Pa(n,f) reaction are used to fix fission barrier parameters.

This analysis of Pa fission data is the major constraint for other neutron cross sections and secondary spectra evaluation for the ^{231}Pa and ^{233}Pa data files. ^{231}Pa and ^{233}Pa data files are compiled. Average unresolved resonance parameters, fast neutron cross sections, angular distributions and secondary neutron spectra differ very much from the previous evaluations.

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Email: maslov@sosny.bas-net.by